

FIG. 1

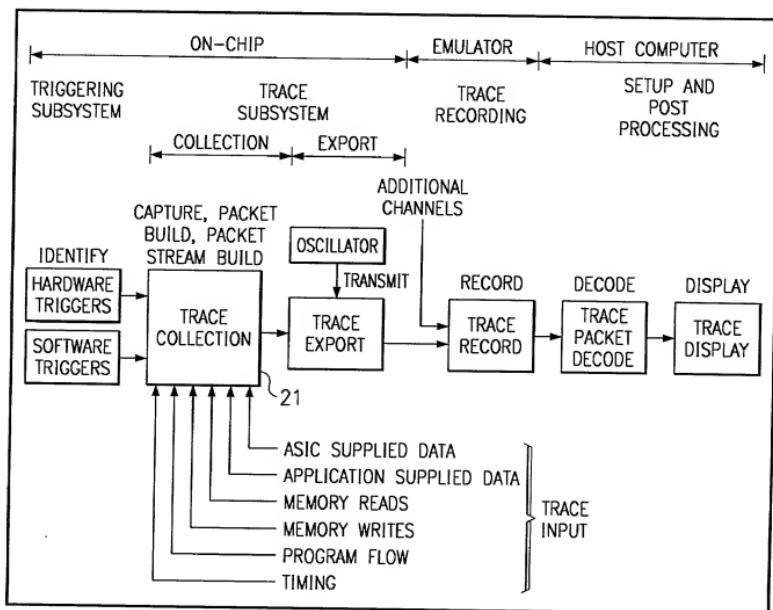


FIG. 2

OPCODE	COMMAND MEANING
00 0000 0000	NO INFORMATION
00 0000 0001	RESERVED
00 0000 0010	PC TRACE GAP
00 0000 0011	REPEAT INSTRUCTION
00 0000 0100	COUNTER START
00 0000 0101	COUNTER OVERFLOW/COUNTER VALUE
00 0000 0110	RESERVED
00 0000 0111	COMMAND ESCAPE
00 0000 1xxx	EXCEPTION OCCURRED
00 0001 0xxx	TIMING SYNC POINT
00 0001 1xxx	MEMORY REFERENCE SYNC POINT
00 0010 xxxx	PC SYNC POINT/FIRST/LAST/trigger
00 010x xxxx	SAME PC
00 011x xxxx	CPU AND ASIC DATA
00 10xx xxxx	RESERVED
00 11xx xxxx	MEMORY REFERENCE BLOCK
01 xxxx xxxx	BRANCH/BEGINNING OF PARAMETER
10 xxxx xxxx	CONTINUE
11 xxxx xxxx	TIMING

FIG. 3

TIMING PACKET EXAMPLES

OPCODE	CYCLE BITS	MEANING
11	00000000	8 CONSECUTIVE CYCLES OF EXECUTION
11	11111111	8 CONSECUTIVE STALL CYCLES
11	11110000	THE RIGHT MOST BITS INDICATE THE PROCESSOR EXECUTED FOR 4 CYCLES AND THEN STALLED 4 CYCLES
11	10101010	THE BITS MEAN EXECUTE, STALL, EXECUTE, STALL, EXECUTE, STALL, EXECUTE, STALL, EXECUTE, AND STALL RESPECTIVELY

FIG. 4

TIMING SYNC PACKET

TIMING SYNC HEADER	3-BIT PC SYNC ID
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FIG. 5

PC SYNC POINT TYPES

TYPE	SYNC TYPE	REASON FOR SYNC POINT
000	TRIGGER	USER DEFINED TRIGGER
001	FIRST POINT	STANDBY MODE
010	SYNC POINT	PERIODICALLY GENERATED
011	FIRST POINT	STREAM ENABLED
100	LAST POINT	STREAM DISABLED

FIG. 6

TIME

PC SYNC POINT		
OPCODE		
00	0010	TYPE (3 BITS)
10	SYNC ID (3 BITS)	RESERVED
10		CURRENT
10		PC
10		ABSOLUTE
10		MSB
		ADDRESS

OPCODES

FIG. 7

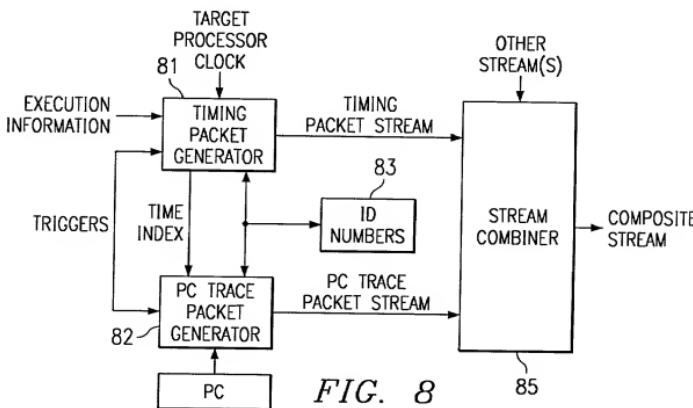


FIG. 8

TIME ↓

91

PACKET SEQUENCE			
0011		LD/ST (1 BIT)	DATA, ADDRESS, PC (5 BITS)
01	DATA BYTE 0 LSB		
10	DATA BYTE 1		
10	DATA BYTE 2		
10	DATA BYTE 3		
10	DATA BYTE 4		
10	DATA BYTE 5		
10	DATA BYTE 6		
10	MSB DATA BYTE 7		
01	DATA ADDRESS BYTE 0 LSB		
10	DATA ADDRESS BYTE 1		
10	DATA ADDRESS BYTE 2		
10	MSB DATA ADDRESS BYTE 3		
01	NATIVE PC ADDRESS BYTE 0 LSB	OR	OFFSET, BITS 7-0 (8 BITS)
10	NATIVE PC ADDRESS BYTE 1		OFFSET, BITS 15-8 (8 BITS) (OPTIONAL)
10	NATIVE PC ADDRESS BYTE 2		NOT NEEDED
10	MSB NATIVE PC ADDRESS BYTE 3		NOT NEEDED

↑
OPCODES

FIG. 9

MEMORY REFERENCE SYNC POINT

OPCODE	PARAMETER FIELD (3-BITS)
00 00011	MSB SYNC ID LSB

FIG. 10

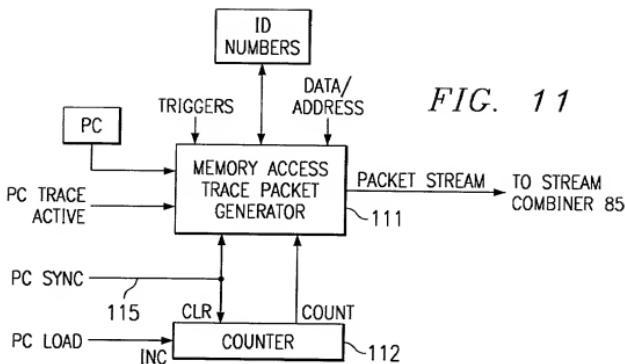


FIG. 12

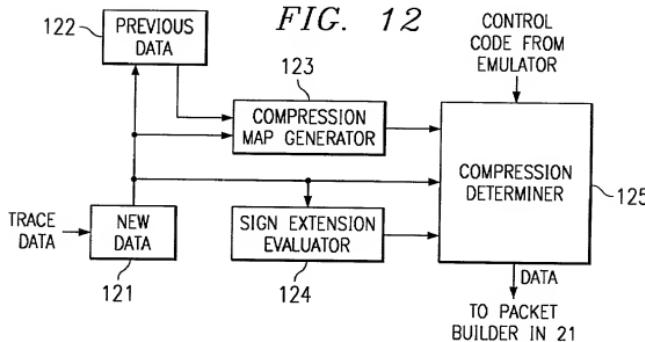
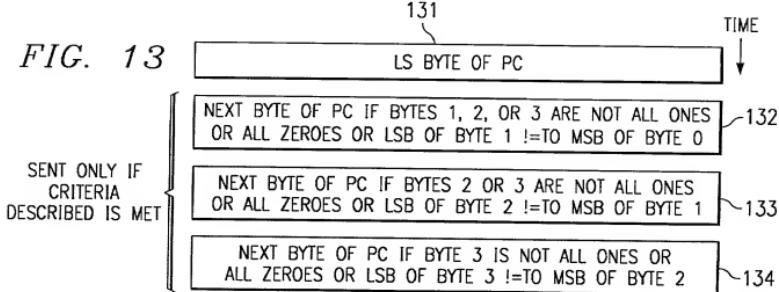


FIG. 13



COMPRESSION EXAMPLE 0				
PREVIOUS DATA	11111111 11111111 11111111 10000011			
NEW DATA	11111111 11111111 11111111 10000011			
COMPRESSION BIT MAP SENT	NONE BECAUSE ONLY ONE BYTE COMPRESSES			
SEND BYTES	DROPPED DROPPED DROPPED SENT BYTE #0 IS SENT			

FIG. 14

COMPRESSION EXAMPLE 1				
PREVIOUS DATA	11111111 11111111 11111111 10000011			
NEW DATA	11111111 11111111 11111111 10000100			
COMPRESSION BIT MAP SENT	NO BECAUSE ONLY ONE BYTE COMPRESSES			
SEND BYTES	DROPPED DROPPED DROPPED SENT BYTE #0 IS SENT			

FIG. 15

COMPRESSION EXAMPLE 2				
PREVIOUS DATA	11101111 11101111 11101111 10000011			
NEW DATA	11101111 11101111 11101111 10000100			
COMPRESSION BIT MAP SENT	YES BECAUSE NO SIGN EXTENSION AND TWO OR MORE BYTES COMPRESS			
SEND BYTES	DROPPED DROPPED DROPPED SENT BYTE #0 IS SENT			

FIG. 16

COMPRESSION EXAMPLE 3				
PREVIOUS DATA	00001000 01111110 11000011 10000100			
NEW DATA	11111111 11111111 11000011 10000100			
COMPRESSION BIT MAP SENT	YES BECAUSE NO SIGN EXTENSION AND TWO OR MORE BYTES COMPRESS			
SEND BYTES	DROPPED DROPPED DROPPED DROPPED NO BYTES ARE SENT			

FIG. 17

COMPRESSION EXAMPLE 4	
PREVIOUS DATA	10000011 00000100 11111111 11111111
NEW DATA	11111111 11111111 11111111 11111111
COMPRESSION BIT MAP SENT	YES BECAUSE TWO OR MORE BYTES NOT COVERED BY SIGN EXTENSION COMPRESS
SEND BYTES	DROPPED DROPPED DROPPED DROPPED NO BYTES ARE SENT

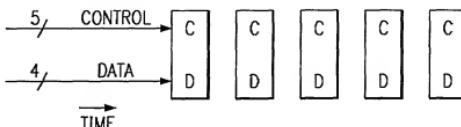
FIG. 18

TIME ↓

00	DATA HEADER	190
10	DATA COMPRESSION MAP BYTE (8 BITS) = 11011001	192
01	LSB DATA BYTE 0 (NOT SENT)	
10	DATA BYTE 1 (SENT)	
10	DATA BYTE 2 (SENT)	
10	DATA BYTE 3 (NOT SENT)	
10	DATA BYTE 4 (NOT SENT)	
10	DATA BYTE 5 (SENT)	
10	DATA BYTE 6 (NOT SENT)	
10	MSB DATA BYTE 7 (NOT SENT)	

↑
OPCODES

FIG. 19

FIG. 20
(PRIOR ART)

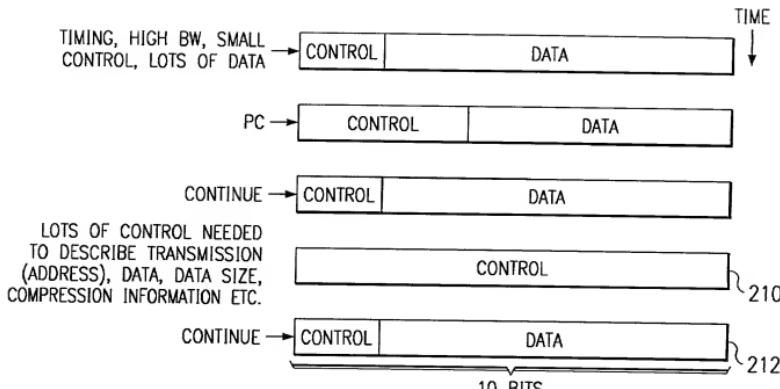


FIG. 21

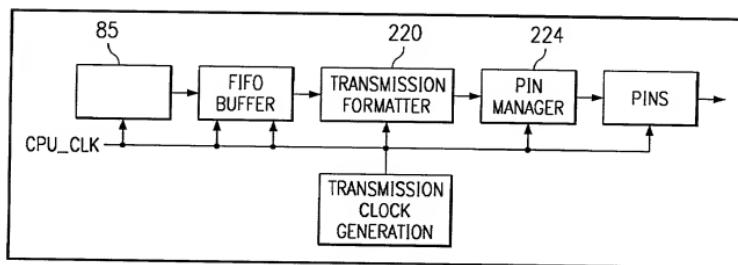


FIG. 22

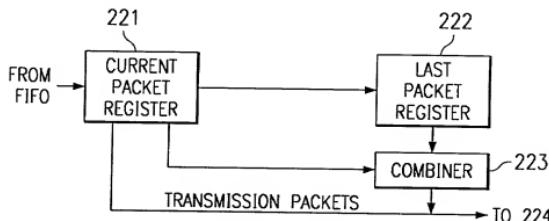


FIG. 22A

6 TRACE PACKETS TRANSMITTED AS 10 TRANSMISSION PACKETS											
10	10	10	10	10	10	10	10	10	10	10	10
6	6	6	6	6	6	6	6	6	6	6	6
TIME →											

FIG. 23

10	10	10	10	10	10	10
12	12	12	12	12	12	12

FIG. 23A

10	10	10	10	10	10	10	10	10
16	16	16	16	16	16	16	16	16

FIG. 23B

#	CURRENT TRANSMISSION PACKET										#	INCOMPLETE TRANSMISSION PACKET									
	9	8	7	6	5	4	3	2	1	0		9	8	7	6	5	4	3	2	1	0
0	9	8	7	6	5	4	3	2	1	0	0	9	8	7	6	5	4	3	2	1	0
1	9	8	7	6	5	4	3	2	1	0	1	9	8	7	6	5	4	3	2	1	0
2	9	8	7	6	5	4	3	2	1	0	1	9	8	7	6	5	4	3	2	1	0
2	9	8	7	6	5	4	3	2	1	0	2	9	8	7	6	5	4	3	2	1	0
3	9	8	7	6	5	4	3	2	1	0	2	9	8	7	6	5	4	3	2	1	0

FIG. 24

221

10/10

222

#	REGISTER										#	REGISTER										
0	9	8	7	6	5	4	3	2	1	0		EMPTY										
0	9	8	7	6	5	4	3	2	1	0		0	9	8	7	6	5	4	3	2	1	0
0	9	8	7	6	5	4	3	2	1	0		0	9	8	7	6	5	4	3	2	1	0
0	9	8	7	6	5	4	3	2	1	0		0	9	8	7	6	5	4	3	2	1	0
1	9	8	7	6	5	4	3	2	1	0	0	9	8	7	6	5	4	3	2	1	0	
1	9	8	7	6	5	4	3	2	1	0	1	9	8	7	6	5	4	3	2	1	0	
2	9	8	7	6	5	4	3	2	1	0	1	9	8	7	6	5	4	3	2	1	0	

FIG. 25

#	REGISTER										#	REGISTER									
0	9	8	7	6	5	4	3	2	1	0		EMPTY									
Z	-	-	Z	E	R	O	E	S	-	-	0	9	8	7	6	5	4	3	2	1	0
Z	-	-	Z	E	R	O	E	S	-	-	Z	-	-	Z	E	R	O	E	S	-	-
Z	-	-	Z	E	R	O	E	S	-	-	Z	-	-	Z	E	R	O	E	S	-	-
1	9	8	7	6	5	4	3	2	1	0	0	Z	-	Z	E	R	O	E	S	-	-
1	9	8	7	6	5	4	3	2	1	0	1	9	8	7	6	5	4	3	2	1	0
2	9	8	7	6	5	4	3	2	1	0	1	9	8	7	6	5	4	3	2	1	0

FIG. 26

#	REGISTER										#	REGISTER									
0	9	8	7	6	5	4	3	2	1	0		EMPTY									
Z	-	-	Z	E	R	O	E	S	-	-	0	9	8	7	6	5	4	3	2	1	0
Z	-	-	Z	E	R	O	E	S	-	-	Z	-	-	Z	E	R	O	E	S	-	-
Z	-	-	Z	E	R	O	E	S	-	-	Z	-	-	Z	E	R	O	E	S	-	-
Z	-	-	Z	E	R	O	E	S	-	-	Z	-	-	Z	E	R	O	E	S	-	-
Z	-	-	Z	E	R	O	E	S	-	-	Z	-	-	Z	E	R	O	E	S	-	-
Z	-	-	Z	E	R	O	E	S	-	-	Z	-	-	Z	E	R	O	E	S	-	-
Z	-	-	Z	E	R	O	E	S	-	-	Z	-	-	Z	E	R	O	E	S	-	-
Z	-	-	Z	E	R	O	E	S	-	-	Z	-	-	Z	E	R	O	E	S	-	-
1	9	8	7	6	5	4	3	2	1	0	Z	-	Z	E	R	O	E	S	-	-	-
1	9	8	7	6	5	4	3	2	1	0	1	9	8	7	6	5	4	3	2	1	0
2	9	8	7	6	5	4	3	2	1	0	2	9	8	7	6	5	4	3	2	1	0

FIG. 27